PART 900

LANDSCAPING AND IRRIGATION

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SECTION 901

GENERAL

All grassed areas disturbed by construction shall be restored to their original (or better) condition unless otherwise indicated by the plans or contract. This work shall be performed to comply with the City Manager's Administrative Regulation AR-78, provided in Subsection 107.11.

Sections in Part 900 contain the requirements for seeding or sodding Fescue, Buffalo, Zoysia and Bermuda grasses. The Engineer may, however, designate or approve other grasses, combinations of grasses, or the method of planting.

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SECTION 902

SEEDING OPERATIONS

902.1 DESCRIPTION

This work shall consist of soil preparation, furnishing and distributing fertilizer, furnishing and planting grass seed, and mulching.

902.2 MATERIALS

Fertilizer:
Fertilizer shall be of commercial grade commercial grade, uniform in composition, free-flowing and suitable for application with approved equipment. Fertilizer shall be delivered to the site in bags or other convenient containers, each fully labeled, conforming to the applicable State Fertilizer Laws, and bearing the same trade name or trademark, analysis and warranty of the producer.

See Table 902.1 for Nitrogen, Phosphorus, and Potassium percentages of fertilizer used in seeding operations.

Seed:
The seed shall be new crop seed complying with and labeled in accordance with U.S. Department of Agriculture rules and regulations under the Federal Seed Act in effect at the time of purchase. All seed shall be furnished in standard containers. Seed which has become moldy, wet or otherwise damaged in transit or storage will not be accepted. Seed shall be stored in a cool, dry place.

The seed supplier shall furnish a certified statement for the seed furnished stating the purity percent, germination percent, and the sproutable seed percent. Sproutable seed is the product of the percentage of purity and the percentage of germination.

a) **Fescue** - A turf-type blend of Fescue seed for south central Kansas shall be planted in areas adjacent to the developed properties which have established maintained turf grassed areas or yards. Fescue K-31 grass seed shall be planted in areas adjacent to undeveloped properties and developed properties which do not have established maintained grassed areas or other established maintained landscaped areas. Grass seed shall have a germination period of fourteen (14) days, a purity of ninety percent (90%) with eighty-five percent (85%) germination, and seventy-six and five tenths percent (76.5%) sproutable seed.

b) **Buffalo** - Texoka, Sharp's Improved, Bison, Plains, or Topgun grass seed shall be planted in all areas. Grass seed shall have been pretreated to enhance germination and have a pure live seed (PLS) content of eighty-five percent (85%). Verifying colorant must be associated with pretreated seed.

c) **Rye** - Annual rye grass used for temporary seeding shall have a purity of ninety-seven percent (97%) and a germination of eighty-five percent (85%).

TABLE 902-1

Seed/Sod	Application Rate	Fertilizer	Application Rate	Seeding/Sodding Season
Fescue Seed	8 lbs per 1000 sf	12% Nitrogen 24% Phosphorus 12% Potassium	850 lbs per acre	Feb 15-April 15 or Aug 15-Oct 15
Buffalo Seed	1.5 lbs PLS per 1000 sf	5% Nitrogen 12% Phosphorus 12% Potassium	40 lbs per acre	Dec 1-April 15
Ryegrass Seed	5 lbs per 1000 sf			
Fescue Sod		0.5 lbs actual Nitrogen 1.0 lbs actual Phosphorus 0.5 lbs actual Potassium		April 1-June 1 or Sept 1-Nov 1
Bermuda/ Zoysia Sod		per 1000 sf		May 1-Aug 15

Mulch:
The materials for this item shall be either Prairie Hay or Bromegrass Hay. Prairie hay shall consist chiefly of the Bluestem grasses, switchgrass, Indian grass, and other desirable native perennial grasses which are normally found growing in Bluestem pastures. Mulching material shall be free of field bindweed, Johnson grass, hoary cress, or Russian knapweed. Areas to be mulched shall be as indicated on the plans or as ordered by the Engineer.

902.3 SOIL PREPARATION

Areas of annual grasses such as cheat, crab grass, tripleawn, etc. shall be destroyed by thorough disking and then replanted using the specified seed.

The areas to be planted shall be prepared for planting by cultivation, removal of all objectionable material, and filling of gullies or depressions. The soil preparation shall be accomplished by disking, harrowing and firming. The minimum depth of the soil preparation shall be four inches (4"). Existing weed stubble, small weeds and grass which can be disked shall be cut by the disk and completely incorporated into the soil. Several diskings and harrowings may be required on some areas to provide a satisfactory seed bed. Areas inaccessible for disking and harrowing shall be prepared by hand methods. The minimum depth of preparation for the seed bed where hand methods must be employed shall be two inches (2").

902.4 FERTILIZING

Fertilizer shall be distributed uniformly over the area to be seeded. The fertilizer shall be incorporated into the soil to a depth of at least two inches (2") by disking or harrowing. Fertilizer may be distributed by means of an approved seed drill which is equipped to sow seed and distribute fertilizer in one operation.

See Table 902-1 for specific application rates.

902.5 SEEDING

See Table 902-1 for specific application rates and seeding seasons.

Seeds shall be uniformly distributed with acceptable drills, hydraulic-slurry (except Buffalo Grass), or other equipment approved by the Engineer. Broadcasting with an approved broadcasting grass seeder will be required on areas where it is impossible to operate a drill and this method may also be required for certain small seeds.

When a standard drill with fertilizer attachment is used, certain mixed seeds may be placed in the seed box and the fertilizer placed in the fertilizer compartment. Both may be applied during one (1) operation, unless notes on the plans require separate applications. Fertilizer may be drilled into the soil or applied by hydraulic-slurry. Broadcasting fertilizer is permissible on rough, rocky slopes where drills cannot operate.

All drills shall be fully adjustable so that they will deliver the seeds and fertilizer at the rates specified on the plans or ordered by the Engineer. Drills that are in poor repair or that do not deliver the seeds and fertilizer uniformly in each drill furrow, shall not be used. Refer to Subsection 902.3 for the appropriate planting depth.

The seed should be drilled in a well-prepared and firm seed bed. When the fertilizing and seeding operations start on an area, that area shall be completed as soon as possible. No seeding shall be done during windy weather or when the ground is wet or otherwise non-tillable. The grass seed shall then be covered, using a flexible toothed weeder or other suitable equipment.

As soon as this covering operation has been completed, the seeded area shall be rolled again with the Culti-packer, the Culti-packer being run over the area only once parallel with the contours of the ground.

902.6 MULCHING

This item shall consist of the furnishing and placing of hay mulch, the purpose of which is to retard erosion on slope areas and to improve the physical condition of the soil so that plant growth will become established more readily. Areas to be mulched shall be as indicated on the plans or as ordered by the Engineer.

Machines for distributing hay mulch shall be approved by the Engineer prior to use and shall be maintained in good operating condition. Distributing machines for hay mulch shall be constructed for this purpose and shall include a blower for the hay. Sufficient power shall be provided on the machine to operate the hay blower in such a manner that the hay can be distributed over the designated at the required rate with a single pass of the machine. The machine shall be provided with an operating platform large enough to accommodate an operator and a supply of hay. Hay blowing distributing machines shall not be used in areas where blowing hay dust would be objectionable to adjacent properties. Such areas shall be mulched using hand methods as prescribed for small areas and/or steep slopes.

The mulching material as specified or permitted shall be placed over the designated areas after seeding and fertilizing has been completed. The mulching material shall be spread uniformly over the areas to be thickness of approximately one and one-half inches (1-1\2") loose measurement. This application rate normally will require approximately two (2) tons of hay per acre. The mulching material shall be disked or punched into the soil so that it is partially covered. The disking operation shall be performed longitudinally with a mulching tiller. Several trips over the mulched areas will be necessary to work part of the hay into the soil, especially if heavy weights are not used on the tiller.

Care shall be exercised to obtain a reasonably even distribution of hay partly incorporated into the soil.

Hay mulch shall be "patted" with forks as it is placed in areas which require mulching by hand because the areas are too small or the slopes are too steep for disking. Soil from these areas shall be placed on top of the mulch to reduce loss due to wind. Cloddy soil shall be placed over these areas on an average of approximately one shovelful of soil to each twenty-five (25) square feet of area.

The stem length of the hay mulch material is important in order for the mulch to intertwine and bind together. Short-stemmed mulching material is much more vulnerable to wind action, than long-stemmed mulching material. When hay mulch is applied with a blower, it may be necessary to remove some of the cutting knives to prevent cutting the mulch stems too short.

The Contractor shall arrange his work so that the mulch can be placed and disked immediately after each area is seeded. Mulching operations shall not lag behind seeding operations more than twenty-four (24) hours during clear weather. When rain is threatening, the Contractor shall make every effort to mulch area the same day on which they are seeded. Mulch shall be replaced before seeds germinate when remulching wind or rain damaged areas.

902.7 MAINTENANCE/ACCEPTANCE

The grassed area shall be protected against traffic or other use immediately after planting. The Contractor shall be responsible for the proper care of the grassed area until all work on the entire contract has been completed and accepted, or a minimum period of thirty (30) days, whichever is the longest duration.

If planting is the last item of work that can be done during the current season, but items of work in the same contract are to be done during the following planting season, the Contractor will be relieved of maintaining the accepted areas after completing all work in connection with seeding as shown on the plans or required in these specifications. All planted areas shall be approved and accepted by the Engineer prior to payment.

902.8 TEMPORARY SEEDING

Description:
This work shall consist of soil preparation, and furnishing and planting temporary grass seed. Mulching of the seeded area may also be required.

Materials:
Material requirements for temporary seed and mulch are provided in Subsection 902.2

Soil Preparation:
Soil preparation shall be as described in Subsection 902.3.

Temporary Seeding:
Temporary seed shall be planted when permanent seed or sod cannot be used due to seasonal limitation.

The Engineer may also direct temporary seed be planted in areas to control erosion.

The application rate for rye grass is provided in Table 902-1.

Mulching:
When directed in the plan or by the Engineer, mulch shall be placed as described in Subsection 902.6.

SECTION 903

SODDING OPERATIONS

903.1 DESCRIPTION

This work shall consist of the furnishing and placing of living grass sod in reasonable conformity with those locations indicated on the Plans or ordered by the Engineer and in accordance with these Specifications.

903.2 MATERIALS

Fertilizer:
Fertilizer shall comply with the requirements of Subsection 902.2 and Table 903-1.

Sod:
Sod shall be cut uniformly according to customary practice for the kind of sod being supplied. Badly torn, broken or dry sod will not be accepted. Sod containing noxious weeds or excessive quantities of foreign grass will not be accepted. Sod shall be cut into strips approximately twenty- four inches (24") wide, and fifty-five inches (55") in length which will approximately equal one (1) square yard of surface area or as is customary for the type of sod involved. Strips that crumble will not be accepted. The sod shall be kept moist until it is placed. Sod furnished under this specification shall be approved for use by the Field Engineer in charge of construction.

a) **Fescue** - Fescue grass sod shall be a turf-type blend of Fescue suitable for south central Kansas and approved by the Engineer.
b) **Bermuda** - Bermuda grass sod shall be Kansas Improved P-16 Mid-Iron, Midlawn, or Midfield.
c) **Zoysia** - Zoysia sod shall be Z-52 Meyer.

TABLE 903-1

Seed	Fertilizer	Season
Fescue Sod	0.5 lbs actual Nitrogen 1.0 lbs actual Phosphorus 0.5 lbs actual Potassium	April 1 - June 1 or Sept 1 - Nov 1
Bermuda/ Zoysia Sod	per 1000 sf	May 1 - Aug 15

903.3 SOIL PREPARATION

The area to be sodded shall be prepared prior to placing the sod by thorough cultivation, smoothing, removal of clods, surface stones one inch (1") in diameter or larger and weeds.

Grades established by the grading Contractor shall be maintained. Cultivation shall consist of pulverizing the soil to a minimum depth of two inches (2") prior to smoothing, finishing, moistening the soil, and placing the sod.

903.4 FERTILIZING

Fertilizer shall be distributed uniformly at rates shown in Section 2.2 and over the area to be sodded, and shall be incorporated into the soil to a depth of at least two inches (2") by disking, harrowing or other methods approved by the Engineer. Distribution shall be done by means of an approved seed fertilizer spreader.

See Table 903-1 for specific application rates.

903.5 SODDING OPERATIONS

See Table 903-1 for Sodding Seasons.

Placing and Cultivation of Sod:
Sod placed on slopes of 2:1 or steeper and in ditch bottoms shall be staked with six (6) stakes per square yard or roll of sod. Sod placed on slopes flatter than 2:1 shall be staked with from two (2) to four (4) stakes per square yard or roll, as determined by the Engineer. Staked shall be of lath or similar materials and shall be driven six inches (6") into the ground, leaving approximately one-half inch (1-1/2") of the top above the sod line. Sod may also be staked using wire stapled of 11-gage ungalvanized wire. Stapled shall be driven flush with the ground.

Strips of sod shall be hand placed tightly against curbs, pavement or previously placed sod strips such that the entire area designated to be sodded will be completely covered. Sod shall be placed to match elevations of existing grass sod, curbs, driveways and sidewalks. Joints in successive rows of sod shall be staggered in a running bond patter such that the ends of the strips being placed will line up with the centerline of strips placed in adjacent rows. Ends and edges of sod shall be top dressed with soil to prevent drying as needed.

Firming Sod:
After placing, all sod shall be firmed by use of an approved roller, a tamper or other approved methods. On steep slopes the sod may be firmed by compacting with sod tampers or hand shovels. The firming process shall ensure good sod-soil contact and allow optimum establishment and rooting of the grass.

903.6 MAINTENANCE/ACCEPTANCE

Maintenance:
As directed by the Engineer, the Contractor shall be required to keep sodded areas mowed and thoroughly watered for twenty 20 days after all sod is placed, and as often as required thereafter until completion of other items of work in the contract. Mowing height shall be as is customary practice for the type of sod involved. Areas shall be mowed when weeds or other vegetation is a maximum height of three inches (3"). Caution shall be taken during the mowing so that the sod is not gouged or dug up. Areas that do not have a satisfactory stand of grass shall be resodded as directed by the Engineer.

Acceptance:
All sodded areas shall have a satisfactory stand of grass, with sod that is moist and growing, when accepted. If sodding is the last item of work that can be done during the current season, but other items of work in the same Contract are to be done during the following planting season, the Contractor will be relieved of maintaining the sod after completing all work in connection with sodding as required in these specifications. Any damage to the accepted sod by the Contractor,

while completing other work in the same contract, will be replaced by the Contractor at his expense.

SECTION 904

ALTERNATE PLANTING METHODS

904.1 GENERAL

The following alternate planting methods may be used when approved by the Engineer, or directed in the plans or specifications. The appropriate planting season will be based on the type of seed or sod to be planted and the planting method used.

904.2 PLUGGING

Soil shall be prepared as described in Subsection 902.3 and to a minimum depth of four inches (4").

Fertilizer shall be applied as described in Subsection 903.4.

Plugs from established sod shall be at least two inches (2") in diameter with two to three inches (2"-3")of soil and roots.

Plugs shall be set at a minimum of twelve-inch (12") intervals and firmed into the soil so the tops are level with the soil surface.

904.3 SPRIGGING

Soil shall be prepared as described in Subsection 902.3 and to a minimum depth of four inches (4").

Fertilizer shall be applied as described in Subsection 903.4.

Sprigs, obtained by tearing apart or shredding established sod shall be four to six inches (4"-6") long and include runner, roots and leaves, but not soil.

Springs shall be planted in shallow trenches two inches (2") deep and six inches (6") apart. Fresh sprigs, not dry, shall be planted four to six inches (4"-6") apart in the row. When planted, one end of each sprig shall be at least two inches (2") below the soil surface, but part of each sprig must be above ground.

904.4 HYDROMULCHING

Hydromulching may be substituted for standard seeding operations when approved by the Engineer.

Specialized equipment shall include a pump, hose, nozzle and tank with both paddle and liquid-type agitators.

After mixing the specified seed type with water, the seed-water suspension shall be applied by pumping through a hose-nozzle arrangement onto the site under a pressure of 90 to 150 psi.

Fertilizer and pulp fiber mulches may also be placed in the hydroseeder tank for application in combination with the seed.

Since hydroseeding applies seed to the surface, effective establishment depends on maintaining adequate soil moisture and minimizing erosion.

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SECTION 905

PLANT MATERIALS

905.1 DESCRIPTION

This work shall include the furnishing, planting and maintaining healthy plant material.

The Contractor is responsible for the location of all utilities in the project area and their protection during the scope of the work. Any damage to these lines during planting operations shall be repaired by the Contractor in a manner approved by the Engineer and at no additional cost to the City.

Referenced Specifications and Standards:
The following specifications and standards of the issues listed below (including the amendments, addenda, and errata), but referred to thereafter by basic designation only, form a part of this Specification to the extend required by the reference hereto.

American Joint Committee on Horticultural Nomenclature Standard (AJCHNS):
1942 Edition - Standardized Plant Names.

American National Standards Institute, Inc.: ANSI Z60.1-1986,
American Standard for Nursery Stock.

Inspection:
The Contractor shall be responsible for all inspection and approval of Plant material that may be required by state, federal and other authorities, and he shall secure any permits and certificates that may be required.

All plants shall be subject to inspection and approval at the place of growth before digging, or upon delivery; such approval shall not impair the right of rejection at the project site during progress of work. Rejected plants shall be removed immediately from the project site.

905.2 MATERIALS

General:
Provide freshly dug plants. Do not prune prior to delivery except as approved by the Engineer. Provide adequate protection of root systems and balls from drying winds and sun. Do not bend or bind-tie plants in such manner as to damage bark, break branches or destroy natural shape. All plant materials shall be free of mechanical injury, decay, or other defects. Provide protective covering during delivery. Do not drop balled and burlapped stock during delivery. Deciduous trees within thirty feet (30') street intersections shall be single trunked trees with branches no lower than five feet (5') above the ground. All plants shall be symmetrical in growth with balanced root and top growth and shall be No. 1 grade or type.

Plants Required:
The plant quantity, size, manner in which to be furnished, scientific, and common names will be shown on the plan. In case of any discrepancy between a Plant List and the actual planting plan, the planting plan shall govern.

Nomenclature:
Scientific and common names of plants herein specified conform with the approved names given in Standardized Plant Names prepared by the AJCHNS.

Quality and Size:
Plants shall be in accordance with ANSI Z60.1. All plants shall have a normal habit of growth and shall be sound, healthy, vigorous and free from disease and insect infestations. The minimum acceptable sizes of all plants, measured before pruning with branches in normal position, shall conform to the measurements specified on the plan. Plants larger in size than specified may be used with the approval of the Engineer, but at no change in the contract price. If larger plants are used, the ball or earth or spread or roots shall be increased proportionately. Minimum branching height for shade and street trees shall be 4 feet unless otherwise specified on planting plans. Tree trunks shall be centered within the rootball or container. Trees with double leaders or bark inclusions will not be accepted.

Balled and Burlapped Plants:
All plants shall be adequately balled with firm, natural balls of soil in sizes and ratios conforming to Table of Minimum Ball Sizes as set forth in ANSI Z60.1. Smaller diameter root balls will be accepted upon approval by the Engineer for plant material produced in "root control" in ground containers. The fabric bag must be removed and the earth ball secured with burlap. Balls shall be firmly wrapped with burlap. Broken balls will not be acceptable. Only nursery stock which has been harvested during the current season will be accepted. Nursery stock which has been held over through the year and re-burlapped will be rejected.

Container Plants:
Plant material specified in containers is meant as a guide for the minimum acceptable root volume. The soil mixture must hold in tact when plant material is removed from the container. Plant material shall have been grown in the container for a minimum of four months. All container plants shall be of the size indicated by the plans. Containers shall be removed from such plants at the time of planting. Soil mixture of container plants must be thoroughly moistened at the time of planting.

Mulch:
Mulch shall be wood chip mulch as used by the City of Wichita Park Department or as approved by the Engineer. Mulch shall be free of any disease organisms, nematodes or larvae.

Commercial Fertilizer:
Commercial fertilizer shall be uniform in composition, free-flowing and conforming to the applicable state and federal fertilizer laws. Deliver to site in unopened original containers each bearing the manufacturer's guaranteed analysis. Fertilizer shall be milorganite or equal organic fertilizer containing the following minimum percentage of plant food by weight:

a) 6 percent available nitrogen
b) 4.6 percent available phosphoric acid
c) 0.8 percent available potash

Water:
Water shall be furnished by the Contractor for execution of all work specified in this Contract. The Contractor shall verify that the water available is suitable for irrigation and free from ingredients harmful to plant life. The Contractor shall water all plant material until the final acceptance.

Wire:
Water shall be pliable, No. 12 gauge, twisted in a double strand allowing for tightening or loosening the guywire during the guarantee period.

Protection of Trees from Wire:
Hose to encase wire used for fastening trees to stakes shall be new, two-ply reinforced rubber garden hose, having an inside diameter or not less than 1/2-inch and with sufficient length to protect the trunk from abrasion.

Stakes:
Stakes for supporting trees shall be a minimum of six feet (6') long heavy duty steel tee posts in accordance with the plan detail drawings. Wooden stakes are not acceptable. (See Detail >)

905.3 PLANTING

Planting Season:
The planting dates for plant material shall be during the months between October 1 and May 15.

Planting shall be performed only when weather and soil conditions are suitable and in accordance with locally accepted practice. Deviation from the above planting dates will be permitted only when approved by the Engineer.

Transport:
Shipping and delivery of plant material will not be acceptable when the air temperatures are below 30 Degrees F. unless approved otherwise by the Engineer.

Temporary Storage and Heeling-in:
When temporary storage or heeling-in is required, the Contractor shall provide and prepare a suitable heeling ground or heeling-in nursery conveniently located near the planting site.

Plant material unloaded and accepted by the Engineer shall be immediately heeled-in or transported to the planting site and planted. Material left out of ground overnight or left with its roots bare to the sun, or otherwise unprotected during transit, unloading or storage shall be rejected by the Engineer, if in his judgment, such lack of protection has caused damage to the roots of the plant or in any other way injured the plant.

Layout:
All plant locations shall be staked in the field by the Contractor and verified by the Engineer prior to planting. Rocks and other underground obstructions shall be removed to depth necessary to permit proper planting according to plans and specifications. Where below-ground or overhead obstructions are encountered, the plants shall be relocated by the Engineer.

Plant Pits:
Excavation of plant pits shall extend to the required depths below finished grade. Plant pits shall be square or circular and have vertical sides and flat bottoms. Plant pits shall be 18 to 24 inches larger in width than the ball or container on the plant. No excavated plant pits will remain open overnight.

Setting:
Balled and containerized plants shall be placed on the undisturbed bottom of the excavated planting pit such that the top of the soil provided with the plant will be level with the adjacent ground line. Backfill with material excavated from the planting pit which shall be thoroughly settled by tamping and a thorough watering. A saucer 4 inches deep shall be formed by placing a ridge of topsoil 3" outside the edge of each planting pit. All twine, rope or binding material shall be cut and removed from around the stem or trunk of the plant. Containers shall be removed from all plants furnished in containers immediately before planting.

Mulch:
Trees are to be mulched with wood chip mulch spread evenly to a depth of 3 to 4 inches within the saucer immediately after placement. Shrubs shall be mulched with wood chip mulch as approved by the Engineer. Fertilize the mulched area immediately after planting by spreading fertilizer at the rate of 3 lb. N/1,000 sq. ft. **NOTE:** This rate would require 1 lb. of fertilizer per 5' diameter tree saucer. Thoroughly water after placement. A depression shall be formed in the mulch around the trunk of the tree or the base of the plant.

Quality and Size:
Plants shall be in accordance with ANSI Z60.1. All plants shall have a normal habit of growth and shall be sound, healthy, vigorous and free from disease and insect infestations. The minimum acceptable sizes of all plants, measured before pruning with branches in normal position, shall conform to the measurements specified on the Plan. Plants larger in size than specified may be used with the approval of the Engineer, but at not change in the contract price. If larger plants are used, the ball or earth or spread or roots shall be increased proportionately. Minimum branching height for shade and street trees shall be 4 feet unless otherwise specified on planting plans. Tree trunks shall be centered within the rootball or container. Trees with double leaders or bark inclusions will not be accepted.

Balled and Burlapped Plants:
All Plants shall be adequately balled with firm, natural balls of soil in sizes and ratios conforming to Table of Minimum Ball Sizes as set forth in ANSI Z60.1. Smaller diameter root balls will be accepted upon approval by the Engineer for plant material produced in "root control" in ground containers. The fabric bag must be removed and the earth ball secured with burlap. Balls shall be firmly wrapped with burlap. Broken balls will not be acceptable. Only nursery stock which has been harvested during the current season will be accepted. Nursery stock which has been held over through the year and re-burlapped will be rejected.

Container Plants:
Plant Material specified in containers is meant as a guide for the minimum acceptable root volume. The soil mixture must hold in tact when plant material is removed from the container. Plant material shall have been grown in the container for a minimum of four months. All container plants shall be of the size indicated by the plans. Containers shall be removed from such plants at the time of planting. Soil mixture of container plants must be thoroughly moistened at the time of planting.

Mulch:
Mulch shall be wood chip mulch as used by the City of Wichita Park Department or as approved by the Engineer. Mulch shall be free of any disease organisms, nematodes or larvae.

Commercial Fertilizer:
Commercial fertilizer shall be uniform in composition, free-flowing and conforming to the applicable state and federal fertilizer laws. Deliver to site in unopened original containers each bearing the manufacturer's guaranteed analysis. Fertilizer shall be milorganite or equal organic fertilizer containing the following minimum percentage of plant food by weight:

a) 6 percent available nitrogen
b) 4.5 percent available phosphoric acid
c) 0.8 percent available potash

Water:
Water shall be furnished by the Contractor for execution of all work specified in this Contract. The Contractor shall verify that the water available is suitable for irrigation and free from ingredients harmful to plant life. The Contractor shall water all plant material until the final acceptance.

Wire:
Water shall be pliable, No. 12 gauge, twisted in a double strand allowing for tightening or loosening the guywire during the guarantee period.

Protection of Trees from Wire:
Hose to encase wire used for fastening trees to stakes shall be new, two-ply reinforced rubber garden hose, having an inside diameter or not less than 1/2-inch (1/2") and with sufficient length to protect the trunk from abrasion.

Pruning:
No pruning shall be done on plants except to remove dead or injured branches. Such pruning shall be done to preserve the plant's natural form and character and in a manner appropriate to its particular requirements. No central leaders shall be cut. All pruning shall be done with clean, sharp tools. Remove and replace excessively pruned and misformed stock resulting from improper pruning. Limbs from pruning will be removed from the planting site or cut into small pieces and placed with mulch.

Staking:
Staking shall be completed by the end of the day for all materials planted during the day that require staking.

All trees shall be staked according to standard detail drawings.

Clean-up:
Upon completion of the planting, all excess soil, stones, and debris which have not previously been cleaned up shall be removed from the site or disposed of, as directed by the Engineer. All ground area disturbed as a result of planting operations shall be restored to its original condition or to the desired new appearance. All labels, flagging, tape, ribbons and twine shall be removed from all plant material and disposed of by the Contractor as approved by the Engineer. The Contractor will also be responsible for removing and disposing of all flags used for marking underground utilities after the plantings are complete.

905.4 MAINTENANCE-PRIOR TO ACCEPTANCE

General:
Maintenance operations shall begin immediately after each plant is planted and shall be continued as required until final acceptance by the Engineer. Plants shall be kept in a healthy growing condition by pruning, spraying, and any other necessary operation of maintenance. Plants shall be inspected by the Contractor during the maintenance period and needed maintenance performed promptly.

Watering:
Watering of trees shall be accomplished by the Contractor until final acceptance.

905.5 ACCEPTANCE, ESTABLISHMENT MAINTENANCE, REPLACEMENT

Final Acceptance:
All plants to be planted on the project shall be planted before April 15th. All deciduous plants, except when planted as replacement plants, shall be planted when the plants are dormant. At the conclusion of plant installation, an inspection shall be made by the Engineer in April. The purpose of this inspection shall be for the acceptance of the contract work. If there are any deficiencies in the work, the Contractor will be notified and the work subject to reinspection before final acceptance. If there are any dead or unhealthy plants identified as a result of the April inspection, they shall be replaced prior to May 15th.

Establishment Maintenance Period:
After final acceptance of the initial plant installation by the Engineer in May the Contractor will be required to provide establishment maintenance care for all plants planted on the project until the following October 1 at which time the Engineer will again inspect the plants. All plants found to be unhealthy or dead at the time of this October inspection shall be replaced in kind and in compliance with the project specifications. The Contractor's responsibility will end at the time of inspection for any plants replaced or accepted in October. During the establishment maintenance period, the Contractor shall inspect the plant materials twice a month (or more as necessary) for watering and other maintenance needs. Contractor shall keep the plants in a healthy growing condition during the establishment maintenance period by providing the necessary care consisting of pruning, spraying, watering, and any other maintenance type operation required. The mulched areas around the plants shall be kept free of weeds and grasses for the full duration of any required establishment maintenance period. All plant stakes shall be maintained as they were originally installed. Should a condition exist that might be injurious to the plant material, which is identified as not a responsibility of the Contractor, the Contractor shall notify the City in writing.

Replacement Plants:
All dead and unhealthy material identified at the time of any specified inspection shall be removed from the site and replaced with plants of the same kind and sizes as originally specified. Such replacements shall be made in the same manner as specified for the original plantings and at no extra cost to the City. All dead and unhealthy plants shall be removed within 14 days after the Contractor has been notified that the plant must be replaced. A penalty of $50 per plant per day will be charged to the Contractor for all days in excess of the 14 days required by the Contractor to remove any plant. Healthy plants must have live and growing branches with foliage of normal size, color, and density. Plants with significant branch die back will be considered as unhealthy and unacceptable. Plants with sparse foliage, foliage which has been significantly damaged by insects or disease, permanently wilted foliage or plants which have defoliated prematurely will be identified as unhealthy and unacceptable. Damage to existing plant materials, sod, sidewalk, etc., during plant replacements shall be repaired without cost to the City.

905.6 PAYMENT

Work required for furnishing and planting plant materials shall be paid for at the Contract unit prices per each for the various kinds, sizes, and grades of plants as identified in the bid form in the project proposal. These prices shall be full compensation for furnishing and planting all plants and shall include all excavation, backfill, tree stakes, guy wire, mulch, watering, establishment maintenance care and for all labor, tools, equipment, and incidentals necessary to complete the work and maintain the plants in a healthy growing condition for the duration of time required. Only 50% of the contract unit price for each plant will be paid to the contractor at the time of the planting of each individual plant. An additional 25% will be paid to the Contractor for any individual plant found to be healthy and growing as a result of the April or May inspection. The remaining 25% of the contract unit price will be paid for any plant when it is accepted or replaced as a result of the October inspection.

SECTION 906

IRRIGATION

906.1 DESCRIPTION

This work shall consist of furnishing and installation of the irrigation system as directed in the plans and specifications.

Within ten (10) calendar days after the Contractor has received the Owner's Notice to proceed, the Contractor shall submit:

a) A materials list of items to be provided in the contract.
b) Manufacturer's Specifications and other data needed to assure compliance with the specified requirements.
c) Manufacturer's recommended installation procedures.

906.2 MATERIALS

Pipe:

a) Galvanized steel pipe

1. Comply with ASTM A120 or ASTM A53, galvanized, Schedule 40, threaded, coupled, and hot-dip galvanized.
2. Fittings: Use 150 lb. rated galvanized malleable iron, banded pattern.

b) Plastic pipe:

1. Use Class 200 IPS, SDR-21 polyvinyl chloride, marked 1120-1220, and bearing the seal of the National Sanitation Foundation.
2. Fittings: Use schedule 40 polyvinyl chloride, type I-II, bearing the seal of the National Sanitation Foundation, and complying with ASTM D2466.
3. For joining, use a fast-acting Hi-etch primer, color: purple, meeting ASTM F-656 and a medium body solvent cement, color: clear, meeting ASTM D-2564, and recommended by the manufacturer's name, pipe size, schedule number, type of material, and code number.
4. Plastic pipe identification: Continuously and permanently mark with manufacturer's name, pipe size, schedule number, type of material, and code number.

Risers:

a) Lawn heads: Use standard cut-off risers or flexible polypipe (funny pipe) with barb fittings. Secure fittings with proper size stainless steel Oeiteker clamps.

b) Shrub heads: Use schedule 80 PVC nipples.

c) Quick coupling valves: Use schedule 80 PVC risers with a multiple swing joint assembly of nipples and elbows to permit readjustment of the valve angle. Flexible polypipe may be used with the Engineer's approval.

Valves:

a) Gate Valves - Use Mueller 125 lb. rated valves, or approved equal, of size required for the line shown on the plan, with "O" ring and operating nut, adaptable to the pipe without AC adapters.

b) **Quick Coupling Valves** - Provide Rainbird, or equivalent equal, one inch, all brass, locked top, to fit single, lug couplers. Deliver to the owner the following items, all matching the approved quick coupling valves:

1. Three keys for locked top
2. Three couplers
3. Three hose swivels

Manual Valve Sleeves:
For manual control valve: Provide polyvinyl chloride class 200-1120 sleeve and rubber marker.

For gate valves: Provide round precast concrete boxes with precast concrete lids, with the word **"WATER"** cast into the lids. Use boxes manufactured by Christy Products, Brooks, or approved equal.

Backflow Preventer:
Provide a reduced pressure principal type of backflow preventer as shown in the plans.

Automatic Irrigation Controller:
Rainbird, Toro, or approved equal shall provide 117 V input, 26.5 V output, with the number of valve stations and in type and model number shown in the plans.

Field Wiring:
Use 14-gauge copper wire with UF insulation. Valve common wire color shall be white and valve wire shall be red. Provide one (1) spare wire, blue in color, to the farthest valve.

Remote Control Valves:
Use valves of the same manufacturer as the approved automatic irrigation controller, slow opening and slow closing, globe pattern, in type and model numbers as shown on the schedule on the drawings, brass construction, 24 V, with epoxy sealed solenoid coils and throttling system.

Remote control valves shall be installed within Ametec, Carson, or approved equal, plastic valve boxes.

Wire Splices:
Waterproof all wire splices with 3M DBY, Scotch-look or equivalent.

Rain Sensor:
Provide a mini-CLIK rain sensor installed and mounted so as to have free access to rainfall.

906.3 PIPE INSTALLATION

Surface Conditions:
Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the work. Do not proceed until unsatisfactory conditions are corrected. Keep stones, debris, scraps of pipe, etc., picked up to maintain a professional and workman-like appearance on the site.

Field Measurements:
Make necessary measurements in the field to ensure precise fit of items in accordance with the approved design.

Trenching and Backfilling:
Trench depth shall be as required for specified cover over pipe. Trench width shall be the minimum necessary as approved by the Engineer to facilitate installation of the system.

Trenches shall be backfilled with excavated material. Unless directed otherwise by the Engineer, pipe shall be "mudded in". This consists of backfilling trenches halfway and flooding with water. After the water has soaked in, the remainder of the trench is backfilled as approved by the Engineer.

Alignment and Depth:
The piping system shall be laid in accordance with the alignment shown on the plans. Where piping is shown on the plans to be under paved areas but running parallel and adjacent to planted areas, the intention is to install the piping in the planted areas.

The minimum depth to install either plastic or galvanized steel pipe shall be eighteen (18) inches.

Pipe Under Existing Pavement:
Piping may be installed under existing pavement by jacking or boring.

Where removal of the existing pavement is necessary, the pavement removal and replacement shall be in accordance with Part 300, and shall be at no additional cost to the owner.

Inspection of Materials:
Carefully inspect pipe and fittings before installation, removing all dirt, scale, and burrs; and reaming as required. Install pipe with markings up for visual inspection.

Plastic Pipe:
a) Exercise care in handling, loading, unloading, and storing plastic pipe and fittings:
   1. Store under cover until ready to install.
   2. Transport only on a vehicle with a bed long enough to allow the pipe to lay flat to avoid undue bending and concentrated external load.
b) Repair dented and damaged pipe by cutting out and discarding the dented or damaged section, and rejoining with a coupling.
c) In jointing, use only the specified solvent and make joints in accordance with the manufacturer's recommendations as approved by the Engineer.
   1. Give solvent welds at least 15 minutes set-up time before moving or handling, and 24 hours curing time before filling with water.
d) Centerload plastic pipe with a small amount of backfill to prevent arching and whipping under pressure.
e) For plastic-to-steel connections:
   1. Work the steel connections first;
   2. Use a non-hardening pipe dope on threaded plastic-to-steel connections.
   3. Use only a light wrench pressure.

Galvanized Pipe:
a) Make cuts square, with cuts thoroughly reamed and rough edges and burrs removed.
b) Make threads sound, clean cut, and well fitting.
c) Use pipe dope on male fittings only.
d) Make screwed joints tight with all necessary wrenches but without handle extensions.

906.4 EQUIPMENT INSTALLATION

Install manual control valves where indicated on the plans and in accordance with the

manufacturer's recommendations as approved by the Engineer.
Install remote control valves within approved plastic valve boxes where indicated on the plans.

Field Wiring:
All wires shall be bundled together and taped every fifty (50) feet. The wires shall be installed in the trench, under the main irrigation line. Enclose wire splices in approved plastic valve box.

Quick Coupling Valves:
a) Install in lawn areas with the top flush with the finish grade, and 8" from pavements and heads.
b) Install in planting areas with tops 2 inches above grade and 8 inches from pavement and heads.
c) Stake each quick coupling valve with 2"x2" knot-free redwood stake set a lest 24 inches into the earth, and extended sufficiently above the surface to ensure stability of the riser.
d) Secure the riser to the stake with an adjustable stainless steel geared clamp.

Lawn Sprinkler Heads:
a) Install where indicated on the drawings and in accordance with the manufacturer's recommendations as approved by the Engineer.
b) Set heads 4 inches above grade on temporary risers for the maintenance period, except along walks and driveways where finished grade is established set heads flush with surface of pavement at time of installation, and 2 inches from pavement.
c) Upon completion of maintenance period, reset heads flush with the grade and firmly anchored with soil.

Shrub Spray Heads:
a) Install where indicated on the drawings and in accordance with the manufacturer's recommendations as approved by the Engineer.
b) Set tops of heads 6 inches above grade.
c) Install part-circle 12 inches from curbs and 8 inches from walks.
d) Set heads along curbs in parking areas 2 inches above top of curb.
e) Stake each shrub head with #6 reinforcing steel bar and secure with adjustable stainless steel geared clamp to ensure stability.

Backflow Preventer:
Install where indicated on the plans and in accordance with all pertinent codes, regulations and the Manufacturer's recommendations as approved by the Engineer.

Unit is to be plumbed with unions to facilitate removal in winter. Provide a quick-coupler with purple (non-potable) lid for blow out. Install fitting between the water meter and the backflow preventer.

Unit is to be housed in an adequate sized cover, being insulated to resist freezing, and mounted on a concrete base as recommended by the Manufacturer. Concrete bases shall not be in contact with piping.

906.5 TESTING AND INSPECTION

Do not allow or cause any of the work of this Section to be covered up or enclosed until it has been inspected, tested, and approved by the Engineer.

Before backfilling the main line, and with control valves in place, but before lateral pipes are connected, completely flush and test the main line.
a) Repair leaks.

b) Flush out each section of lateral pipe before sprinkler heads are attached.

Testing:
a) Make necessary provision for thoroughly bleeding the line of air and debris.
b) Before testing, fill the line with water for a period of at least 24 hours.
c) After valves have been installed, test live water lines for leaks at a pressure of 150 psi for a period of two hours, with couplings exposed and with pipe sections center loaded.
d) Provide required testing equipment and personnel.
e) Repair leaks, and retest until acceptance by the Engineer.

Final Inspection:
a) Clean, adjust, and balance all systems. Verify that:
   1. Remote control valves are properly balanced;
   2. Heads are properly adjusted for radius and arc of coverage;
   3. The installed system is workable, clean, and efficient.

906.6 OPERATING INSTRUCTIONS

Attach a typewritten legend inside each controller door, stating the areas covered by each remote control valve.

After the system has been completed, inspected, and approved, instruct the owner's maintenance personnel in the operation and maintenance of the system.

Provide the City with two (2) keys to the controller.

Prove the City a reproducible "as-built" drawing of the irrigation layout including:
a) Any variance from the original plan.
b) Measurements to all valves, quick couplers, and wire splices.
c) Clear identification of the wire route.
d) Expanded drawings and measurements of details not clearly shown at plan scale.

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